XCEL ENERGY
APPLICATION TO THE MINNESOTA ENVIRONMENTAL QUALITY BOARD FOR A ROUTE PERMIT

MANKATO ENERGY CENTER
115 kV AND 345 kV TRANSMISSION LINES

ALTERNATIVE PERMITTING PROCESS
EQB DOCKET NO. 04-86-TR-XCEL

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List of Acronyms and Abbreviations

ACSR	Aluminum conductor steel reinforced
BCE	before common era
BMP	best management practice
BPA	Bonneville Power Administration
CON	Certificate of Need
dB	Decibels
dBA	A-weighted sound level recorded in units of decibels
d/b/a	doing business as
DNR	Minnesota Department of Natural Resources
EMF	electromagnetic field
EQB	Minnesota Environmental Quality Board
G	Gauss
HVTL	high voltage transmission line
Hz	Hertz
kV	Kilovolt
MDH	Minnesota Department of Health
mg/L	milligrams per liter – equivalent to parts per million (ppm)
MNDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MVA	Megavolt ampere
MW	megawatt
NAC	noise area classification
NERC	North American Electric Reliability Council
NESC	National Electrical Safety Code
NEV	Neutral-to-earth voltage
NIEHS	National Institute of Environmental Health Sciences
NPDES	National Pollution Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
PEMC	Palustrine, Emergent, Seasonally Flooded
PFOC	Palustrine, Forested, Seasonally Flooded
ppm	parts per million
PUC	Public Utilities Commission
PWI	Public Waters Inventory
ROW	Right-of-Way
SHPO	State Historic Preservation Office
SPCC	Spill Prevention, Control and Countermeasure
SWPPP	Stormwater pollution prevention plan
USDOE	United States Department of Energy
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

1.0 PROJECT SUMMARY

Northern States Power Company, d/b/a Xcel Energy (Xcel Energy or the Company), submits this application for a Route Permit to the Minnesota Environmental Quality Board (EQB) pursuant to Minnesota Rules Chapter 4400 and Minnesota Statutes Chapter 116C. The particular facility for which the permit is requested is a new 345 kV transmission line and two new 115 kV transmission lines needed to connect the proposed Mankato Energy Center facility being developed by the Mankato Energy Center, LLC (Mankato Energy), a subsidiary of Calpine Corp. (Calpine), to the electrical transmission system at the Wilmarth Substation. The route for these lines will be approximately 1000 feet long. Mankato Energy has applied to the Public Utilities Commission (PUC or Commission) for a certificate of need (CON) for the construction of the Mankato Energy Center (PUC Docket No. IP6345/CN-03-1884). The CON application seeks approval of these three transmission lines directly associated with the plant, which are necessary to interconnect the plant to the transmission system.

1.1 ELIGIBILITY FOR THE ALTERNATIVE PERMITTING PROCESS

The EQB rules provide for an Alternative Permitting Process for certain facilities. (Minnesota Rule 4400.2000, Subpart 1.A.-G. The Mankato Energy Center-to-Wilmarth Substation high voltage transmission lines include two 115 kV transmission lines and a 345 kV transmission line. The two 115 kV transmission lines qualify for the Alternative Permitting process because they meet Minnesota Rule 4400.2000, Subpart 1.C. (high voltage transmission lines (HVTL) between 100 and 200 kV). The 345 kV transmission qualifies for the Alternative Permitting Process because it meets Minnesota Rule 4400.2000, Subpart 1.D. (HVTL is in excess of 200 kV and the line is less than five miles in length in Minnesota). The EQB submittal requirements are listed on Table 1.1 with cross-references indicating where information can be found elsewhere in this application.

Table 1.1
Completeness Checklist

Authority	Required Information	Where
4400.1150, Subp. 2 Required per 4400.2100	**Site Permit for LEPGP** A. a statement of proposed ownership of the facility at the time of filing the application and after commercial operation	2.1
	B. the precise name of any person or organization to be initially named as permittee or permittees and the name of any other person to whom the permit may be transferred if transfer of the permit is contemplated	2.2
	C. at least two proposed routes for the proposed high voltage transmission line and identification of the applicant's preferred route and the reasons for the preference	Not applicable, per 4400.2100
	D. a description of the proposed high voltage transmission line and all associated facilities including the size and type of the high voltage transmission line	2.4, 3.2, 3.4
	E. the environmental information required under 4400.1150, Subp. 3	See 4400.1150, Subp. 3 (A)-(H) Below
	F. identification of land uses and environmental conditions along the proposed routes	4.1; 4.2.4
	G. the names of each owner whose property is within any of the proposed routes for the high voltage transmission line	5.2.1
	H. United States Geological Survey topographical maps or other maps acceptable to the chair showing the entire length of the high voltage transmission line on all proposed routes	Appendix B
	I. identification of existing utility and public rights-of-way along or parallel to the proposed routes that have the potential to share right-of-way with the proposed line	3.2.3
	J. the engineering and operational design concepts for the proposed high voltage transmission line, including information on the electric and magnetic fields of the transmission line	3.2; 3.5
	K. cost analysis of each route, including the costs of constructing, operating, and maintaining the high voltage transmission line that are dependent on design and route	2.6
	L. a description of possible design options to accommodate expansion of the high voltage transmission line in the future	3.2.2
	M. the procedures and practices proposed for the acquisition and restoration of the right-of-way, construction, and maintenance of the high voltage transmission line	3.3
	N. a listing and brief description of federal, state, and local permits that may be required for the proposed high voltage transmission line	5.3

Authority	Required Information	Where
	O. a copy of the Certificate of Need or the certified HVTL list containing the proposed high voltage transmission line or documentation that an application for a Certificate of Need has been submitted or is not required	1.0
4400.1150, Subp. 3	**Environmental Information** A. a description of the environmental setting for each site or route	4.1
	B. a description of the effects of construction and operation of the facility on human settlement, including, but not limited to, public health and safety, displacement, noise, aesthetics, socioeconomic impacts, cultural values, recreation, and public services	4.2
	C. a description of the effects of the facility on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining	4.3
	D. a description of the effects of the facility on archaeological and historic resources	4.4
	E. a description of the effects of the facility on the natural environment, including effects on air and water quality resources and flora and fauna	4.5
	F a description of the effects of the facility on rare and unique natural resources	4.6
	G. identification of human and natural environmental effects that cannot be avoided if the facility is approved at a specific site or route	All of Section 4 in "Potential Impacts"
	H. a description of measures that might be implemented to mitigate the potential human and environmental impacts identified in items A to G and the estimated costs of such mitigative measures	All of Section 4 in "Mitigative Measures"
4400.1350, Subp. 2 (Applicable to Alternative Permitting Process Per 4400.2300)	**Notice of Project** Subpart 2. Notification to persons on general list, to local officials, and to property owners	Will be submitted within 15 days of application submission
4400.2000, Subp. 1(C) and Subp. 2.	Subpart 1. **Eligible Projects**. An applicant for a site permit or a route permit for one of the following projects may elect to follow the procedures of parts 4400.2000 to 4400.2950 instead of the full permitting procedures in parts 4400.1025 to 4400.1900: high voltage transmission lines of between 100 and 200 kilovolts	1.1
	Subpart 2. **Notice to EQB**. An applicant for a permit for one of the qualifying projects in subpart 1, who intends to follow the procedures of parts 4400.2000 to 4400.2750, shall notify the EQB of such intent, in writing, at least ten days before submitting an application for the project	Appendix A
4400.2100	**Contents of Application** (alternative permitting process) The applicant shall include in the application the same information required in part 4400.1150, except the applicant need not propose any alternative sites or routes to the preferred site or route. If the applicant has rejected alternative sites or routes, the applicant shall include in the application the identity of the rejected sites or routes and an explanation of the reasons for rejecting them	See also 4400.1150, Subp.2 above

Authority	Required Information	Where
4400.3150	**Factors Considered** A. effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services	6.1
	B. effects on public health and safety	6.2
	C. effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining	6.3
	D. effects on archaeological and historic resources	6.4
	E. effects on the natural environment, including effects on air and water quality resources and flora and fauna	6.5
	F. effects on rare and unique natural resources	6.6
	G. application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity	6.7
	H. use or paralleling of existing rights-of-way, survey lines, natural division lines, and agricultural field boundaries	6.8
	I. use of existing large electric power generating plant sites	6.9 (not applicable)
	J. use of existing transportation, pipeline, and electrical transmission systems or rights-of-way	6.10
	K. electrical system reliability	6.11
	L. costs of constructing, operating, and maintaining the facility which are dependent on design and route	6.12 (not applicable)
	M. adverse human and natural environmental effects which cannot be avoided	6.13
	N. irreversible and irretrievable commitments of resources	6.14
4400.3350, Subps. 1 and 2	Subpart 1. **Wilderness areas**. No high voltage transmission line may be routed through state or national wilderness areas Subpart 2. **Parks and natural areas**. No high voltage transmission line may be routed through state or national parks or state scientific and natural areas unless the transmission line would not materially damage or impair the purpose for which the area was designated and no feasible and prudent alternative exists. Economic considerations alone do not justify use of these areas for a high voltage transmission line	Not Applicable
4400.3450	**Prohibited Sites**	Not Applicable
Minn. Stat. §116C.57, Subd. 4 (applicable per Minn. Stat. §116C.575, Subd. 8)	**Considerations in designating sites and routes** (1) Evaluation of research and investigations relating to the effects on land, water and air resources of large electric power generating plants and high voltage transmission lines and the effects of water and air discharges and electric and magnetic fields resulting from such facilities on public health and welfare, vegetation, animals, materials and aesthetic values, including base line studies, predictive modeling, and evaluation of new or improved methods for minimizing adverse impacts of water and air discharges and other matters pertaining to the effects of power plants on the water and air environment	3.5; 4.1-4.6; 6.1-6.3, 6.5, 6.6
	(2) Environmental evaluation of sites and routes proposed for future development and expansion and their relationship to the land, water, air and human resources of the state	3.2.2, 6.7

Authority	Required Information	Where
	(3) Evaluation of the effects of new electric power generation and transmission technologies and systems related to power plants designed to minimize adverse environmental effects	Not applicable
	(4) Evaluation of the potential for beneficial uses of waste energy from proposed large electric power generating plants	Not applicable
	(5) Analysis of the direct and indirect economic impact of proposed sites and routes including, but not limited to, productive agricultural land lost or impaired	4.2.5, 4.3.1, 6.3
	(6) Evaluation of adverse direct and indirect environmental effects that cannot be avoided should the proposed site and route be accepted	All of Section 4 in "Potential Impacts", 6.1-6.6
	(7) Evaluation of alternatives to the applicant's proposed site or route proposed pursuant to subdivisions 1 and 2	Not applicable to alternative process
	(8) Evaluation of potential routes that would use or parallel existing railroad and highway rights-of way	3.2.3, 6.8
	(9) Evaluation of governmental survey lines and other natural division lines of agricultural land so as to minimize interference with agricultural operations	4.3.1, 6.8
	(10) Evaluation of the future needs for additional high voltage transmission lines in the same general area as any proposed route, and the advisability of ordering the construction of structures capable of expansion in transmission capacity through multiple circuiting or design modifications	3.2.2, 6.7
	(11) Evaluation of irreversible and irretrievable commitments of resources should the proposed site or route be approved	6.14
	(12) When appropriate, consideration of problems raised by other state and federal agencies and local entities	5.1

1.2 NOTICE TO THE EQB

Xcel Energy notified the EQB by letter dated June 17, 2004, that the Company intended to utilize the Alternative Permitting Process for the proposed Mankato Energy Center. This complies with the requirement of Minnesota Rule 4400.2000 Subpart 2 to notify the EQB at least 10 days prior to submitting an application. A copy of this notice is attached in Appendix A.

2.0 INTRODUCTION

2.1 STATEMENT OF OWNERSHIP OF THE PROPOSAL

Xcel Energy is headquartered in Minneapolis, Minnesota. It is a wholly owned subsidiary of Xcel Energy, Inc., the fourth-largest combination electricity and natural gas energy company in the United States. Xcel Energy provides electricity services to approximately 1.2 million residential, commercial, and industrial customers in Minnesota, and natural gas services to 400,000 such customers.

Xcel Energy will construct, own, operate, and maintain the 115 kV and 345 kV transmission lines and the Wilmarth Substation expansion. The switchyard at the Mankato Energy Center will be owned by Mankato Energy.

2.2 PERMITTEE / PROJECT MANAGER

The permittee for the Project will be:

Permittee: Northern States Power Company, a Minnesota Corporation
d/b/a Xcel Energy
414 Nicollet Mall
Minneapolis, Minnesota 55401

Contact: Pamela J. Rasmussen, Permitting Analyst
Address: P.O. Box 8
Eau Claire, Wisconsin 54701
Phone: (715) 839-4661
Fax: (715) 839-2480
Email: pamela.jo.rasmussen@xcelenergy.com

2.3 PROJECT LOCATION

The Project will be located in Blue Earth County, Minnesota (Appendix B.1 and B.2). The following table summarizes the project location:

Table 2.1 Proposed Transmission Line Locations

County	Township Name	Township	Range	Section
Blue Earth	Lime	109N	26W	SW¼ 31

2.4 PROJECT PROPOSAL

Xcel Energy proposes to construct a new 345 kV transmission line and two new 115 kV transmission lines connecting the Mankato Energy Center to the Wilmarth Substation. The route will be approximately 1000 feet long. The new Mankato Energy Center will have a switchyard where the line will connect with the new facility. The Wilmarth Substation will be expanded to accommodate the new 345 kV and 115 kV lines. The expansion details are discussed in Section 3.5.

2.5 PROJECT SCHEDULE

Xcel Energy proposes an in-service date of all the facilities by June 2006. Construction will likely begin on the substation this fall, with a majority of the work occurring in 2005. One of the 115 kV lines is planned to be in-service in November 2005 to accommodate start-up activities for the Mankato Energy Center facility. By March 2006 a majority of the work will be complete to provide for three months testing and commissioning to accommodate the generator's commercial in-service date of June 1, 2006. Minor work will occur in the substation until the final in-service date of June 2006.

2.6 PROJECT COSTS

Xcel Energy has prepared a preliminary cost estimate for the transmission lines and substation work associated with this application. The Project costs are estimated to be **$9.5** million and a breakdown of the preliminary estimate is as follows:

345 kV Transmission Line	$350,000
Two 115 kV Transmission Lines	$475,000
Wilmarth Substation Expansion and Upgrades	$8,700,000
Total Project Costs:	**$9,525,000**

3.0 ENGINEERING DESIGN, CONSTRUCTION, AND RIGHT-OF-WAY ACQUISITION

3.1 ROUTE DESCRIPTION

The proposed route is identified in Appendix B.3. Xcel Energy requests that the EQB grant a route permit for the Project as described below and shown on the route map. Xcel Energy requests that a 1000-foot long and 800 foot wide route be approved from the northern edge of the Mankato Energy Center switchyard to the edge of the parking lot south of Wilmarth Substation.

The Mankato Energy Center is proposing a switchyard on the western edge of the facility where the transmission lines will connect with the new power plant. The 115 kV lines will run parallel as they exit the northern portion of the Mankato Energy Center switchyard. The two 115 kV lines will then transition to a single pole, double circuit structure and will run south to the southern edge of the Mankato Energy Center plant site before heading west into the Wilmarth Substation near the existing access road to the substation. The 115 kV lines will terminate on the southern edge of the Wilmarth Substation where the existing 115 kV bays are located. The 345 kV line will begin at the southern edge of the Mankato Energy Center switchyard and will extend west over the 115 kV and 161 kV lines that run along the eastern edge of the Wilmarth Substation. The 345 kV line will terminate on the northern edge of the Wilmarth Substation. The Wilmarth Substation will be expanded to the south to accommodate the two new 115 kV transmission lines entering the facility.

As shown in Appendix B.3, the 345 kV and 115 kV transmission lines will need to cross over several existing transmission lines that enter or pass by the Wilmarth Substation between the substation and the Mankato Energy Center. Certain clearance requirements will need to be met in order to design lines that comply with the National Electric Safety Code (NESC). The current plans propose to relocate the Summit-to-Wilmarth 115 kV line to a new pole just east of the substation, which will terminate in a new bay that will be constructed as part of the substation expansion. The Summit-to-Loon Lake/West Faribault 115 kV line will remain on the same pole, but will occupy the arms vacated by the Summit-to-Wilmarth 115 kV transmission line. Specific details of the structure locations cannot be determined until a detailed survey is conducted and the detailed substation expansion and line designs are complete.

3.2 ENGINEERING AND OPERATIONAL DESIGN

3.2.1 TRANSMISSION STRUCTURES AND ROW DESIGN

3.2.1.1 Transmission Structure Design

Figure 3.1 depicts the double circuit structures that are proposed to be used for the 115 kV lines. A steel dead end structure will be constructed for the 115 kV lines as they enter the Mankato Energy Center. Figure 3.2 depicts the H-frame structure that will be used for the 345 kV line.

The double circuit 115 kV lines will be constructed on a single steel pole with a concrete or caisson foundation. The conductor will be 795 ACSR. The conductor capacity will be 975 amps or 190 MVA.

The 345 kV line is planned to be constructed on wood H-frame structures. Depending upon the final design and location of the structures, steel H-frame structures may also be used. The conductor is proposed to be double-bundled (two conductors) 795 ACSR conductors for each phase. The conductor capacity of the line will be 1950 amps or 388 MVA.

The table below summarizes the structure design for each of the lines.

Table 3.1
Structure Design Summary

Line Voltage	Structure Type	Pole Type	Foundation	Double Circuit/ Single Circuit	Height (feet)
115 kV	Davit Arm	Steel	Concrete/Steel Caisson	Double	70–80
345 kV	H Frame	Steel/Wood	Concrete/Steel Caisson	Single	80–115

Figure 3.1: 115 kV/115 kV Steel Double Circuit Davit Arm Structure

Figure 3.2: 345 kV Steel Single Circuit H-Frame Structure

The proposed transmission line will be designed to meet or surpass all relevant state codes, and North American Electric Reliability Council (NERC) and Xcel Energy standards. Appropriate

standards will be met for construction and installation, and all applicable safety procedures will be followed during and after installation.

3.2.1.2 Right-of-Way

The majority of the proposed project will be constructed on property currently owned by Xcel Energy. Some ROW may be required from Calpine to accommodate the interconnection into Mankato Energy Center.

3.2.2 Design Options to Accommodate Future Expansion

The three transmission lines proposed for this Project are being designed to the voltage required to handle the projected capacity from the Mankato Energy Center. Xcel Energy is not proposing to build the lines to accommodate greater capacity than that required for the generating facility.

The Wilmarth substation is being expanded to handle the three new lines from the Mankato Energy Center.

3.2.3 Identification of Existing Utility and Public Rights-of-Way

No existing utility and public ROW will be utilized for the proposed project. The Project will be within existing Xcel Energy and Calpine property.

3.3 RIGHT-OF-WAY ACQUISITION, CONSTRUCTION, RESTORATION, AND MAINTENANCE PROCEDURES

3.3.1 Right-of-Way Acquisition

Depending upon the final design, a short section of ROW may need to be acquired from Calpine for this project. No ROW will be required.

3.3.2 Transmission Construction Procedures

Construction is planned to begin once required approvals are obtained. A detailed construction schedule will be developed based upon availability of crews, outage restrictions for lines that may be affected, weather conditions, and any restrictions placed on certain areas for minimizing impacts from construction.

The steel poles for the double circuit 115 kV lines are approximately three to four feet in diameter and will require a hole drilled approximately 15 to 30 feet deep. The 115 kV steel structures are proposed to be supported by drilled concrete pier foundations or steel caissons approximately five to eight feet in diameter.

The wood poles for the H-frame 345 kV line are approximately two to four feet in diameter and the steel poles are approximately four to six feet in diameter. The holes for the 345 kV wood poles will be approximately 14 to 16 feet deep. If steel poles are used, the holes will be approximately 30 to 40 feet deep with a foundation size of five to seven feet in diameter. Any excess soil from the excavations will be placed in upland areas. The 345 kV steel structures, if needed, are proposed to be supported by a drilled concrete pier foundation or steel caisson.

Any structures located in poor or wet soil conditions may require a specially engineered foundation (such as a steel caisson) that would be vibrated into the ground. The poles will then be placed within the caisson.

Erosion control methods will be implemented to minimize runoff during construction. Xcel Energy construction crews or an Xcel Energy contractor will comply with local, state, NESC, and Xcel Energy standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, ROW widths, erection of power poles, and stringing of transmission line conductors.

Insulators and other hardware will be attached while the pole is on the ground. The pole will then be lifted, placed, and secured on the foundation by a crane. Once the structures have been erected, conductors will be installed.

3.3.3 RESTORATION PROCEDURES

During construction, crews will attempt to limit ground disturbance wherever possible. Disturbed areas will be restored to their original condition to the maximum extent practicable. Post-construction reclamation activities include the removing and disposing of debris, dismantling all temporary facilities, employing appropriate erosion control measures, and reseeding areas disturbed by construction activities with vegetation similar to that which was removed.

3.3.4 MAINTENANCE PROCEDURES

Xcel Energy will periodically perform inspections, maintain equipment, and make repairs over the life of the line. Xcel Energy will also conduct regular routine maintenance approximately every five years to remove undesired vegetation that may interfere with the safe and reliable operation of the proposed transmission line.

3.4 WILMARTH SUBSTATION

3.4.1 SUBSTATION PROPERTY ACQUISITION

The Wilmarth Substation is located approximately 1000 feet west of the proposed Mankato Energy Center. No additional property will need to be acquired to accommodate the substation construction for this Project. All of the work required for the Wilmarth Substation will be contained within the existing Xcel Energy property.

3.4.2 SUBSTATION DESIGN

Modifications to this substation will include:

- The existing 345 kV area of the substation will accommodate the need for the additional 345 kV equipment. The major equipment to be added will include two 345 kV circuit breakers, a new overhead line termination structure, protective relaying for the new connection, and associated switches and bus work.

- An expansion, approximately 200 feet by 75 feet in size, will occur to the south to accommodate the relocation of three existing 115-69 kV transformers and allow more space for the new 115 kV transmission lines connections. The major equipment to be added will include seven new 115 kV circuit breakers, two sets of 69 kV underground cable for two of the relocated transformers, expansion of the existing steel structures, protective relaying for the new and modified lines, transformers, and bus, and associated switch and bus work. Trenching work will be required within the fenced area to bury underground control and power cables. Gravel will be placed over the affected area.

- Xcel Energy will design the flood control berm around the additions to the Wilmarth Substation. In conjunction with the Spill Prevention, Control and Countermeasure (SPCC) plan for the facility; the Company will also upgrade the oil retention structures.

A drawing of the proposed changes is included as Appendix B.3.

3.4.3 SUBSTATION CONSTRUCTION

Approximately one acre of land will be graded to accommodate the Wilmarth Substation expansion. Once the site is graded and a flood control berm constructed, a perimeter fence will be installed to secure the site. Once concrete foundations are poured to support the substation equipment, erection of the substation equipment would commence.

Erosion control measures similar to those described in Section 3.3.3 will be implemented to minimize runoff during construction. Xcel Energy will restore the site to pre-construction contours.

3.4.4 SUBSTATION RESTORATION AND MAINTENANCE PROCEDURES

Xcel Energy will perform periodic inspections, maintain equipment, and make repairs over the life of the substation. Xcel Energy will also conduct routine maintenance as required to remove undesired vegetation that may interfere with the safe and reliable operation of the substation.

3.5 ELECTRIC AND MAGNETIC FIELDS

The term EMF refers to electric and magnetic fields that are coupled together such as in high frequency radiating fields. For the lower frequencies associated with power lines, EMF should be separated into electric and magnetic fields. Electric and magnetic fields arise from the flow of electricity and the voltage of a line. The intensity of the electric field is related to the voltage of the line and the intensity of the magnetic field is related to the current flow through the conductors. Transmission lines operate at 60 hertz (cycles per second). This is the non-ionizing band of the electromagnetic spectrum.

3.5.1 ELECTRIC FIELDS

Voltage on any wire (conductor) produces an electric field in the area surrounding the wire. The electric field associated with a high voltage transmission line extends from the energized conductors to other nearby objects such as the ground, towers, vegetation, buildings, and vehicles. The electric field from a power line gets weaker as one moves away from the line. Nearby trees and building material also greatly reduce the strength of power line electric fields.

The intensity of electric fields is associated with the voltage of the line and is measured in kilovolts per meter (kV/m). Power line electric fields near ground are designated by the difference in voltage between two points (usually one meter). Table 3.2 provides the electric fields at maximum conductor voltage for the proposed 115 kV and 345 kV transmission lines. Maximum conductor voltage is defined as the nominal voltage plus five percent.

Table 3.2
Calculated Electric Fields (kV/m) for Proposed 115 and 345 kV Transmission Line Designs
(3 Feet Above Ground)

Type	Voltage	Distance to Proposed Centerline								
		-300'	-200'	-100'	-50'	0'	50'	100'	200'	300'
345 kV Single Circuit H-frame	362 kV	0.04	0.1	0.9	2.9	1.5	2.9	0.9	0.1	0.04
345 kV Single Circuit Single Pole Davit Arm	362kV	0.04	0.1	0.5	2.1	2.6	2.1	0.7	0.1	0.05
115/115 kV Single Pole Davit Arm	120/120 kV	0.003	0.007	0.02	0.09	0.58	0.09	0.02	0.007	0.003

The proposed 115 kV transmission line will have a maximum magnitude of electric field density of approximately 0.58 kV per meter underneath the conductors one meter above ground level. The proposed 345 kV transmission line will have a maximum magnitude of electric field density of approximately 1.5 kV per meter underneath the conductors one meter above ground level. This is significantly less than the maximum limit of 8 kV per meter that has been a permit condition imposed by the Minnesota EQB in other HVTL applications. The Minnesota EQB standard was designed to prevent serious hazard from shocks when touching large objects, such as tractors, parked under extra high voltage transmission lines of 500 kV or greater.

3.5.2 MAGNETIC FIELDS

Current passing through any conductor, including a wire, produces a magnetic field in the area around the wire. The magnetic field associated with a high voltage transmission line surrounds the conductor and decreases rapidly with increasing distance from the conductor. The magnetic field is expressed in units of magnetic flux density, expressed as gauss (G).

The question of whether exposure to power-frequency (60 hertz) magnetic fields can cause biological responses or even health effects has been the subject of considerable research for the past three decades. There is presently no Minnesota statute or rule that pertains to magnetic field exposure. The most recent and exhaustive reviews of the health effects from power-frequency fields conclude that the evidence of health risk is weak. The National Institute of Environmental Health Sciences (NIEHS) issued its final report, "NIEHS Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields" on June 15, 1999, following six years of intensive research. NIEHS concluded that there is little scientific evidence correlating EMF exposures with health risk.

The Minnesota State Interagency Working Group on EMF Issues, consisting of members from the Minnesota Department of Health, Department of Commerce, PUC, Pollution Control Agency and EQB conducted research related to EMF, which resulted in similar findings to the NIEHS report. The group issued "A White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options" in September of 2002 wherein it stated:

> Research on the health effects of EMF has been carried out since the 1970s. Epidemiological studies have mixed results – some have shown no statistically significant association between exposure to EMF and health effects, and some have shown a weak association. More recently, laboratory studies have failed to show such an association, or to establish a biological mechanism for how magnetic fields may cause cancer.

The group concluded:

> *The Minnesota Department of Health (MDH) concludes that the current body of evidence is insufficient to establish a cause and effect relationship between EMF and adverse health effects.* However, as with many other environmental health issues, the possibility of health risk from EMF cannot be dismissed.

(Emphasis added.)

The conclusions of the Minnesota State Interagency Working Group are also consistent with those reached by the Minnesota Department of Health in 2000.

While the general consensus is that electric fields pose no risk to humans, the question of whether exposure to magnetic fields potentially can cause biological responses or even health effects continues to be the subject of research and debate. In addressing this issue, Xcel Energy provides information to the public, interested customers and employees for them to make an informed decision about EMF. Xcel Energy will provide measurements for landowners, customers, and employees who request them. In addition, Xcel Energy has followed the "prudent avoidance" guidance suggested by most public agencies. This includes using structure designs that minimize magnetic field levels and siting facilities in locations with the fewest number of people living nearby.

Table 3.3 provides the existing and estimated magnetic fields based on the proposed line and structure design. The expected magnetic field for the proposed structure type and voltage has been calculated at various distances from the center of the pole in milligauss.

Table 3.3
Calculated Magnetic Flux Density (milligauss) for Proposed
115 kV and 345 kV Transmission Line Designs (3 feet Above Ground)

Type	Condition	Amps	Distance to Proposed Centerline								
			-300'	-200'	-100'	-50'	0'	50'	100'	200'	300'
345 kV Single Circuit H-frame	Average	540	2.0	4.3	16	42	68	42	16	4.3	2.0
	Peak	900	3.3	7.2	26	70	113	70	26	7.2	3.3
345 kV Single Circuit Single Steel Pole Davit Arm	Average	540	1.1	2.6	9.9	31	65	28	11	3.1	1.4
	Peak	900	1.9	4.3	16	51	108	47	18	5.1	2.4
115/115 kV Double Circuit, Single Steel Pole Davit Arm	Average	375/375	0.06	0.19	1.3	6.4	31	6.5	1.3	0.2	0.1
	Peak	750/750	0.12	0.38	2.6	13	62	13	2.7	0.4	0.1

3.5.3 STRAY VOLTAGE

Stray voltage is defined as a natural phenomenon that can be found at low levels between two contact points in any animal confinement area where electricity is grounded. Electrical systems, including farm systems and utility distribution systems, must be grounded to the earth by code to ensure continuous safety and reliability. Inevitably, some current flows through the earth at each point where the electrical system is grounded and a small voltage develops. This voltage is called neutral-to-earth voltage (NEV). When a portion of this NEV is measured between two objects that may be simultaneously contacted by an animal, it is frequently called stray voltage. Stray voltage is not electrocution, ground currents, EMFs, or earth currents.

Stray voltage has been raised as a concern on some dairy farms because it can impact operations and milk production. Problems are usually related to the distribution and service lines directly serving the farm or the wiring on a farm affecting farm animals that are confined in areas of electrical use. In those instances when transmission lines have been shown to contribute to stray voltage, the electric distribution system directly serving the farm or the wiring on a farm was directly under and parallel to the transmission line. These circumstances are considered in installing transmission lines and can be readily mitigated. The new 115 kV or 345 kV transmission lines are not proposed to run parallel to any existing distribution line for long distances. Therefore, no stray voltage issues are anticipated with this Project.

4.0 ENVIRONMENTAL INFORMATION

This section provides a description of the environmental setting, potential impacts and mitigative measures Xcel Energy has proposed. Measures to minimize the impacts of siting, constructing and operating the proposed Project are also addressed if necessary. The majority of the measures proposed are part of the standard construction process at Xcel Energy. Unless otherwise identified in the following text, the costs of the mitigative measures proposed are considered nominal.

4.1 DESCRIPTION OF ENVIRONMENTAL SETTING

The proposed site is located just north of the Mankato city limits in Lime Township, Blue Earth County. The Wilmarth Substation is located adjacent to the Minnesota River in an oxbow. There is a demolition waste landfill to the northeast of the substation, and the proposed Mankato Energy Center will be located 1000 feet to the east of the substation. North and east of the site agricultural and conservation lands are the prevailing land use. The transmission lines will cross a wetland area that lies at the toe of the slope where the Mankato Energy Center will be constructed.

4.2 HUMAN SETTLEMENT

4.2.1 PUBLIC HEALTH AND SAFETY

4.2.1.1 Potential Impacts

The Project will be designed in compliance with local, state, NESC, and Xcel Energy standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, strength of materials, and ROW widths. Xcel Energy construction crews and/or contract crews will comply with local, state, NESC, and Xcel Energy standards regarding installation of facilities and standard construction practices. Established Xcel Energy and industry safety procedures will be followed during and after installation of the transmission line. This will include clear signage during all construction activities.

The proposed transmission line will be equipped with protective devices to safeguard the public from the transmission line if an accident occurs, such as a structure or conductor falls to the ground. The protective devices are breakers and relays located where the line connects to the substation. The protective equipment will de-energize the line should such an event occur. In addition, the substation facility will be fenced and access limited to authorized personnel. Proper signage will be posted warning the public of the risk of coming into contact with the energized equipment.

The costs associated with these measures have not been tabulated separately from the overall Project costs since these measures are standard practice for Xcel Energy.

4.2.1.2 Mitigative Measures

There are no mitigative measures necessary to address human health and safety.

4.2.2 DISPLACEMENT

4.2.2.1 Potential Impacts

Displacement of residential homes or businesses will not occur. The transmission lines are designed to span an area zoned industrial. There are no buildings currently on site that are not associated with the Wilmarth Generating Plant and Substation.

4.2.2.2 Mitigative Measures

Since no displacement will occur, no mitigative measures are required.

4.2.3 NOISE

4.2.3.1 Potential Impacts

Noise is comprised of a variety of sounds of different intensities, across the entire frequency spectrum. Humans perceive sound when sound pressure waves encounter the auditory components in the ear. These components convert these pressure waves into perceivable sound. Transmission conductors and transformers at substations produce noise under certain conditions. The level of noise or its loudness depends on conductor conditions, voltage level, and weather conditions. Noise emission from a transmission line occurs during heavy rain and wet conductor conditions. In foggy, damp, or rainy weather conditions, power lines can create a subtle crackling sound due to the small amount of the electricity ionizing the moist air near the wires. During heavy rain the general background noise level is usually greater than the noise from a transmission line. In addition, very few people are out near the transmission line. For these reasons audible noise is not noticeable during heavy rain. During light rain, dense fog, snow, and other times when there is moisture in the air, the proposed transmission lines will produce audible noise higher than rural background levels but similar to household background levels. During dry weather, audible noise from transmission lines is a nearly imperceptible, sporadic crackling sound.

Noise is measured in units of decibels (dB) on a logarithmic scale. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more "weight." The A-weighted (dBA) scale corresponds to the sensitivity range for human hearing. Noise levels capable of being heard by humans are measured in dBA, the A-weighted sound level recorded in units of decibels. A noise level change of 3-dBA is imperceptible to human hearing. A 5-dBA change in noise level, however, is clearly noticeable. A 10-dBA change in noise levels is perceived as a

doubling of noise loudness, while a 20-dBA change is considered a dramatic change in loudness. Table 4.1 shows noise levels associated with common, everyday sources and places the magnitude of noise levels discussed here in context.

Table 4.1
Common Noise Sources and Levels

Sound Pressure Level (dB)	Typical Sources
120	Jet aircraft takeoff at 100 feet
110	Same aircraft at 400 feet
90	Motorcycle at 25 feet
80	Garbage disposal
70	City street corner
60	Conversational speech
50	Typical office
40	Living room (without TV)
30	Quiet bedroom at night

Source: Environmental Impact Analysis Handbook, ed. by Rau and Wooten, 1980

Minnesota Rule 7030.0040 establishes standards to regulate noise levels by land use types. Land uses such as picnic areas, churches, or commercial land are assigned to an activity category based on the type of activities occurring in each respective land use. Activity categories are then sorted based on their sensitivity to traffic noise. The Minnesota Pollution Control Agency (MPCA) noise regulations (Minnesota Rule 7030.0050) list the activity categories by Noise Area Classification (NAC). The table below identifies the established noise standards for daytime and nighttime by NAC.

Table 4.2
Noise Standards by Noise Area Classification

Noise Area Classification	Daytime		Nighttime	
	L_{50}	L_{10}	L_{50}	L_{10}
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

The nearest noise receptors to the Project are the Wilmarth Generating Station to the southwest of the Wilmarth Substation and the various businesses in the industrial park to the south, all of which would fall within NAC 2 or 3. There are no residences within 2500 feet of the Project. The noise levels from the proposed line and substation expansion are comparable to the existing noise environment and will not impact land uses near the Project.

Another source of noise associated with transmission lines is corona. Corona on transmission line conductors can generate electromagnetic noise that can cause interference with radio waves, primarily with AM radio stations and the video portion of TV signals, depending on the frequency and strength of the radio and television signal. Although radio and television interference sometimes occurs, Xcel Energy investigates all such problems and corrects those problems caused by Xcel Energy facilities. Xcel Energy does not expect that there will be any impacts from the operation of the new line.

4.2.3.2 Mitigative Measures

No mitigative measures are necessary since there will be nominal corona or noise impacts from the Project.

4.2.4 AESTHETICS

4.2.4.1 Potential Impacts

The proposed structures for the transmission lines will be similar to the existing land uses near the site. The land is currently owned by Xcel Energy and at this time is used by the utility for a generating station and a substation. The existing Wilmarth Substation will be expanded south on Xcel Energy property to accommodate the 115 kV transmission lines. North of the site is a rise in topography, and there are also several existing transmission lines that enter the substation and generating station from the north. To the south are industrial and manufacturing facilities, which

include a waste processing company, auto salvage yard, scrap metal operations, a construction company, a U.S. Postal Service mail processing facility, and a household hazardous waste collection site. On the eastern edge of the site, there is a rise in topography to where the Mankato Energy Center will be located. The western edge of the site is bordered by the Minnesota River.

The proposed structures for the transmission line will be between 70 and 140 feet in height. These structures will be similar in height to the surrounding buildings, including the proposed Mankato Energy Center, and will thus be consistent with existing aesthetics and land use.

4.2.4.2 Mitigative Measures

No mitigative measures are anticipated since the Project will be comparable to existing adjacent industrial, manufacturing, and utility facilities.

4.2.5 SOCIOECONOMIC

Population and economic characteristics based on the 2000 U.S. Census are presented in Table 4.3. The data represent a summary of this information for the county and the block group, which is the smallest geographic unit the census measures.

Table 4.3
Population and Economic Characteristics

Location	Population	Per Capita Income	Percentage of Population Below Poverty Level
Blue Earth County	**55,941**	**$18,712**	**12.9**
Census Tract 9703, Block Group 1	1,284	$15,146	14.3

Source: 2000 U.S. Census: General Demographic Characteristics

According to the 2000 Census race demographics, Blue Earth County is 95 percent white. The Census Tract and Block Group that the Project occurs within is approximately 97 percent white, similar to the rest of the county. Minority groups in the area constitute a very small percentage of the total population. The 2000 Census shows that the primary minority group in this Block Group is "American Indian and Alaska Native." The Project area does not contain disproportionately high minority populations or low-income populations.

4.2.5.1 Potential Impacts

The Project is required due to the construction of the proposed Mankato Energy Center. Any socioeconomic impacts would be primarily due to the new generating facility, and not the result of the transmission lines. In the Site Application for the Mankato Energy Center (MEQB Docket No. 04-76-PPS Calpine), the socioeconomic impacts for the proposed plant were predicted to be primarily positive on the local community.

Between eight and twelve workers will be required by Xcel Energy for transmission line construction and six to eight workers for substation construction. The transmission crews are expected to spend approximately six weeks constructing the transmission line. The substation crews will be at the site for approximately seventeen months. During construction, there will be a small positive impact on the community due to the expenditures of the construction crews in the local community.

4.2.5.2 Mitigative Measures

Mitigative measures are not necessary.

4.2.6 CULTURAL VALUES

Cultural values include those perceived community beliefs or attitudes in a given area, which provide a framework for each social group's unity. Mankato was originally an important gateway for commerce between southern Minnesota and Minneapolis/St. Paul using both the Minnesota River and eventually the railroad as means for transporting goods. Today, Mankato is an important regional center for education, health care, commerce, industry, and agriculture.

4.2.6.1 Potential Impacts

No impacts are anticipated to the communities' cultural values due to the construction of the transmission lines and the expansion of the substation.

4.2.6.2 Mitigative Measures

No impacts are anticipated; therefore no mitigative measures are required.

4.2.7 RECREATION

Recreational opportunities near the site include the East Minnesota River State Game Refuge, the Minnesota River, Sakatah Singing Hills State Trail, and several local City of Mankato parks. The East Minnesota River State Game Refuge is located along the east side of the Minnesota River and extends north to the town of Kasota. According to the site application submitted by Mankato Energy, the refuge designation allows property owners within the refuge to protect wildlife by

restricting firearm hunting on their property. There are no special environmental regulations or land use restrictions other than hunting.

The Minnesota River is approximately 800 feet west of the Project. Recreational activities associated with the river include boating, fishing, and hunting. The Minnesota River is a designated State Canoe Route.

Sakatah Singing Hills State Trail is a 39-mile trail that connects Mankato and Faribault and is part of the Mankato trail system. The trail currently begins east of the Project, following an abandoned railroad grade, but the City of Mankato has plans to continue the trail along the railroad, approximately 1300 feet south of the Project (Appendix B.2).

4.2.7.1 Potential Impacts

There are several recreation facilities near the Project, but the construction and operation of the facilities will not directly impact these resources. Although the substation may be visible from the river to individuals using the resource, the expansion of the substation and new transmission lines are minor additions to an area with many utility and industrial structures currently on-site, and would not alter the visual character of the area.

4.2.7.2 Mitigative Measures

Since there are no impacts to recreational resources anticipated, no mitigation is required.

4.2.8 PUBLIC SERVICES

The City of Mankato provides typical public infrastructure to the community.

4.2.8.1 Potential Impacts

It is not anticipated that the Project will affect public services.

4.2.8.2 Mitigative Measures

Since no impacts are anticipated, no mitigation is required.

4.3 LAND-BASED ECONOMICS

4.3.1 AGRICULTURE

Blue Earth County is one of the leading agricultural producers in the State. The County is ranked third in the state in livestock production. Primary crops in the area are corn and soybean.

4.3.1.1 Potential Impacts

No agricultural land will be taken out of production as a result of the construction and operation of the Project. The closest agriculture fields are approximately one-half mile to the north of the site.

4.3.1.2 Mitigative Measures

No mitigative measures are required since no impacts to agriculture are anticipated.

4.3.2 FORESTRY

The project will be built near the Minnesota River and there are trees associated with a floodplain forest such as willow, box elder, and cottonwood.

4.3.2.1 Potential Impacts

There are no forested land based economies within the Project vicinity that will be affected. For potential impacts to Flora, please see Section 4.5.3.

4.3.2.2 Mitigative Measures

No mitigative measures will be required.

4.3.3 TOURISM

4.3.3.1 Potential Impacts

The site is not located near any tourist attractions that would be impacted by the Project.

4.3.3.2 Mitigative Measures

No mitigative measures are anticipated with regard to tourism.

4.3.4 MINING

4.3.4.1 Potential Impacts

The proposed transmission line will not impact active mining operations. The project will be constructed adjacent to the Mankato Energy Center, which will be constructed on the site of a former limestone quarry that has been mined to completion. There are several active gravel pits and quarries in the area. These mining operations will not be impacted by the Project.

4.3.4.2 Mitigative Measures

No mitigative measures are necessary because the Project will not impact any mining operations.

4.4 ARCHAEOLOGICAL AND HISTORIC RESOURCES

4.4.1 POTENTIAL IMPACTS

Via a June 24, 2004 email, the State Historical Preservation Office (SHPO) informed HDR Engineering, Inc. (HDR), a consultant assisting Xcel Energy on the Project, that no archaeological sites had been previously recorded in the Project area. It commented on the fact that additional information may be needed in order to understand the potential for identifying historic properties in the Project area, but did not provide recommendations regarding the need for a cultural resources survey.

SHPO also sent a letter in September 2003 informing Wenck Associates, a consultant assisting Mankato Energy with the proposed Mankato Energy Center, that the plant site location had no known or suspected historic properties. Since the plant site is adjacent to the transmission project area, it is reasonable to conclude that there is very little potential for previously unrecorded cultural resources to be identified in the Project area.

4.4.2 MITIGATIVE MEASURES

Given the recent history of previous SHPO determinations in the immediate vicinity, it is reasonable to assume that no mitigation measures would be required since no previously unidentified historic properties are likely to be found in the project area.

4.5 NATURAL ENVIRONMENT

4.5.1 AIR QUALITY

4.5.1.1 Potential Impacts

Currently, both state and federal governments have regulations regarding permissible concentrations of ozone and oxides of nitrogen. The national standard is 0.08 ppm on an eight-hour averaging period. The state standard is 0.08 ppm based upon the fourth-highest eight-hour daily maximum average in one year.

Calculations using the Bonneville Power Administration (BPA) Corona and Field Effects Program Version 3 (USDOE, BPA Undated) for a standard single circuit 345 kV Project predicted a maximum concentration of 0.008 ppm near the conductor, and 0.0003 ppm at one meter above ground, during foul weather or worst-case conditions (rain at 4 inches per hour). During a mist rain

(rain at 0.01 inch per hour) the maximum concentrations decreased to 0.0003 ppm near the conductor, and 0.0001 ppm at one meter above ground level. For both cases, these calculations of ozone levels are well below the federal and state standards. Studies designed to monitor the production of ozone under transmission lines have generally been unable to detect any increase due to the transmission line facility. Given this, there will be no measurable impacts relating to ozone for the Project.

The only potential air emissions from a 115 kV transmission line result from corona and are limited. Corona can produce ozone and oxides of nitrogen in the air surrounding the conductor. Corona consists of the breakdown or ionization of air in a few centimeters or less immediately surrounding conductors. For a 115 kV transmission line, the conductor gradient surface is usually below the air breakdown level. Usually some imperfection such as a scratch on the conductor or a water droplet is necessary to cause corona. Ozone also forms naturally in the lower atmosphere from lightning discharges and from reactions between solar ultraviolet radiation and air pollutants such as hydrocarbons from auto emissions. The natural production rate of ozone is directly proportional to temperature and sunlight and inversely proportional to humidity. Thus, humidity (or moisture), the same factor that increases corona discharges from transmission lines, inhibits the production of ozone. Ozone is a very reactive form of oxygen and combines readily with other elements and compounds in the atmosphere. Because of its reactivity, it is relatively short-lived. The Project area presently meets all federal air quality standards.

During construction of the proposed transmission line and substation there will be limited emissions from vehicles and other construction equipment and fugitive dust from ROW clearing. Temporary air quality impacts caused by construction-related emissions are expected to occur during this phase of activity.

The magnitude of the construction emissions is influenced heavily by weather conditions and the specific construction activity occurring. Exhaust emissions from primarily diesel equipment will vary according to the phase of construction, but will be minimal and temporary. Adverse impacts to the surrounding environment will be minimal because of the short and intermittent nature of the emission and dust-producing construction phases.

4.5.1.2 Mitigative Measures

Xcel Energy does not anticipate significant impacts to air quality, therefore no mitigation is necessary.

4.5.2 WATER QUALITY

The surface water resources that could be affected by the construction of the transmission line or the expansion of the substation are the Minnesota River, which is a DNR Public Water, and the adjacent wetlands. The Minnesota River is located 800 feet to the west of the existing Wilmarth Substation. The Wilmarth Substation is located in an old oxbow of the Minnesota River.

The proposed transmission lines will cross a wetland complex identified as Palustrine, Emergent, Seasonally Flooded (PEMC) and Palustrine, Forested, Seasonally Flooded (PFOC) on the National Wetland Inventory (NWI) maps of the U.S. Fish and Wildlife Service (USFWS). A wetland delineation at the site confirmed the presence of these wetland areas, located east of the Wilmarth substation.

4.5.2.1 Potential Impacts

During construction there is the possibility of sediment reaching surface waters as the ground is disturbed by excavation, grading, and construction traffic. Once the project is complete it will have no impact on surface water quality. No direct impacts to the Minnesota River are anticipated.

The expansion of the substation will not impact any wetlands. Depending on the final transmission line design requirements, Xcel Energy may place at least one transmission line structure in a wetland to accommodate the substation expansion and to tie into the Mankato Energy Center. There are certain clearance requirements that must be met for the 345 kV transmission line to cross the Summit-to-Loon Lake 115 kV transmission line. Given the terrain grade changes in the short distance between the plant and the substation, Xcel Energy is limited in its line design options to avoid wetlands between the plant and substation.

4.5.2.2 Mitigative Measures

Where possible, Xcel Energy will attempt to avoid placing poles in wetlands. If placement of poles in wetlands is necessary, Xcel Energy will minimize impacts by using special construction mats to limit disturbance and compaction. The Company will also attempt to construct during the winter to further minimize any potential impacts to the wetlands. Xcel Energy will follow standard erosion control measures such as using silt fencing to prevent impacts to adjacent water bodies. If areas of the wetland are disturbed, Xcel Energy will restore the area to preconstruction contours and will allow the existing seed bank to revegetate the area. Any soil removed from the wetlands will not be placed back into the wetland.

The placement of a transmission line structure in the wetland would be covered under the Corps of Engineers GP/LOP-98-MN permit for Minnesota.

4.5.3 FLORA

Flora that the transmission lines will cross will be typical of the types of vegetation found in emergent wetlands (PEMC) and wooded wetlands (PFOC). The area surrounding the substation has been previously disturbed, and is vegetated primarily in grasses and goldenrod, with several types of common weeds such as thistles and dandelions. Some wetland flora may be impacted by the Project due to pole placement and substation expansion. These wetland areas are vegetated in sedges, cattails, bulrush, iris, marsh marigold, reed canary grass, and duckweed. The slopes near the wetland are vegetated with several types of trees such as willow, box elder, and cottonwood. The area between the Mankato Energy Center and the Wilmarth Substation is vegetated with trees, primarily cottonwood, that will have to be removed due to the construction of the transmission line. Only trees that would prevent the safe operation of the lines will be removed.

4.5.3.1 Potential Impacts

Impacts to trees will occur where the three new transmission lines cross between the proposed Mankato Energy Center and the Wilmarth Substation. As noted in section 4.5.2.1, it may be necessary to place transmission line poles within the wetland east of the site. Actual impacts to wetland flora will not be known until the final design of the transmission lines is complete.

The area of trees that will be impacted by the proposed project due to the routing of these transmission lines is expected to be approximately two acres. A width of 150 feet will be cleared for the 345 kV transmission line ROW, whereas the 115 kV transmission line will only require a width of 75 feet for the ROW. The table below summarizes the impacts for each line and the substation expansions.

Table 4.4
Summary of Impacts to Trees

Impact Action	Impact Type	ROW Width	Area Impacted (acres)
115 kV substation expansion	Tree clearing	N/A	0.20
345 kV transmission line construction	Tree clearing	150	1.20
115/115 kV transmission line construction	Tree clearing	75	0.73
115 kV transmission line relocation	Tree clearing	75	0.08
		Total Impacts	**2.21 acres**

4.5.3.2 Mitigative Measures

Water and soil conservation practices may include containing excavated material, protecting exposed soil, and stabilizing restored soil. The Company will avoid major disturbance of the wetland during construction. To minimize impacts the Company will work to place poles where they should have

the least impact. In addition, Xcel Energy will use specially engineered mats in the wetlands during construction to minimize impacts.

Xcel Energy will only remove trees located in the area of the substation expansion and right-of-way for the transmission lines, or that would impact the safe operation of the facility.

4.5.4 FAUNA

The Minnesota River is home to many types of wildlife common to Minnesota such as waterfowl, pheasant, deer, beaver, mink, raccoon, hawks, owls, songbirds, and shorebirds. There are also many types of fish in the river, most commonly carp, but walleye, northern pike, and smallmouth bass are also common. The wetland area immediately to the east of the Wilmarth Substation provides habitat for many different types of birds. Several types of waterfowl, egrets, warblers, and other perching birds were observed during a field visit in May 2004. Evidence of use of the site by small mammals and deer was also present during the field visit.

4.5.4.1 Potential Impacts

There is a potential for temporary displacement of wildlife during construction and loss of small amounts of habitat from the Project. Wildlife that inhabit the trees that will be removed for the transmission lines will likely be displaced. Comparable habitat is adjacent to the site, and it is likely that these organisms would only be displaced a short distance.

4.5.4.2 Mitigative Measures

Since no permanent impacts to fauna are anticipated at this location, and the area does not have a history of bird collisions, no mitigation is necessary.

4.6 RARE AND UNIQUE NATURAL RESOURCES

The following is a list of rare or unique resources identified by the DNR in a letter to HDR, dated July 6, 2004. These resources are located within one mile of the proposed Mankato Energy Center and 115 kV and 345 kV transmission lines. Six known occurrences of rare species or special communities have been identified. The resources in Table 4.5 were compiled using the DNR Natural Heritage Database (NHNRP Contact #: ERDB 20040929).

Table 4.5
Rare and Unique Resources

Common Name	Number of Occurrences	Scientific Name	Federal Status[1]	MN Status[1]	State Rank[2]
Racer	1	Coluber constrictor		SPC	
Silver Maple	N/A	Floodplain Forester Silver Maple			S3
Bald Eagle	1	Haliaeetus leucocephalus	LT	SPC	
Mesic Prairie	N/A	Mesic Praire			S1
Mussel Sampling Site	N/A	Mussel Sampling Site #121			
Paddlefish	1	Polyodon spathula		THR	

1) LT: Listed Threatened; THR: Threatened; SPC: Special Concern
2) State Rank: A rank is assigned to the natural community type, which reflects the known extent and condition of that community in Minnesota. Ranks range from 1 (in greatest need of conservation action in the state) to 5 (secure under present conditions).

4.6.1 POTENTIAL IMPACTS

The DNR did not identify any known occurrences of rare and unique resources that would be affected by the proposed project (Appendix C.1 – C.3). This review is similar to the one described in the Mankato Energy Center Site Permit Application (Appendix C.4 – C.6).

The USFWS did not identify any potential impacts to rare, threatened, or endangered species for the associated Mankato Energy Center project. Section 9.0 of the Mankato Energy Center Site Permit Application identifies the correspondence with the USFWS in more detail. The Mankato Energy Center application states that the USFWS verbally confirmed that no federally listed species have been documented near the project area, and the plant would not adversely affect any threatened and endangered species or their critical habitat. However, DNR records identify a bald eagle nesting site, which is protected under the Bald & Golden Eagle Protection Act and the Federal Endangered Species Act, within one mile of the site. Activities within one-half mile of the eagle nest location need to be limited during nesting times. The Xcel Energy project is outside this half mile, so no measures would be required. Xcel Energy anticipates that the USFWS review of the effects on threatened and endangered species will be similar for the transmission line project.

4.6.2 MITIGATIVE MEASURES

It is not anticipated that mitigative measures will be necessary.

5.0 AGENCY INVOLVEMENT, PUBLIC PARTICIPATION AND REQUIRED PERMITS AND APPROVALS

5.1 AGENCY CONTACTS

5.1.1 MINNESOTA DEPARTMENT OF NATURAL RESOURCES

The DNR Natural Heritage and Non-game Research Program was contacted on June 9, 2004 to review the Project area for State threatened and endangered species and rare natural features. In the DNR's response, received July 6, 2004, six rare species or natural communities were identified within a mile radius of the project (See Table 4.5). However Sara Hoffman, on behalf of the DNR, stated that based on the nature and location of the Project none of the known occurrences of rare features will be affected (Appendix C.1 – C.3).

5.1.2 MINNESOTA SHPO

SHPO was asked to provide comment regarding potential effects to known or suspected archaeological sites or historic standing structures in the project area. SHPO did not identify any known or suspected historic properties in the adjacent area during their review of the Mankato Energy Center (see Letter from SHPO to Wenck Associates, September 2003, in Appendix C.7). On June 24, 2004, SHPO provided a general email response to a June 9 request for comment on Xcel Energy's Project, stating that no known historic properties were within the project area. Although no comment regarding suspected properties or the need for a cultural resources survey was provided, the recent SHPO communication regarding the low potential for historic properties in the immediate vicinity of the proposed Mankato Energy Center suggests that it is reasonable to assume that the Project also has a low probability of impacting historic properties, and so there should be no need for a cultural resources survey.

5.1.3 USFWS

Xcel Energy sent a letter to the USFWS on June 9, 2004 requesting a review of the Project. To date, no response has been received. However, the USFWS provided a verbal confirmation for the Mankato Energy Center project that no threatened and endangered species or critical habitat will be affected by the proposed project. Xcel Energy believes that due to the relationship of the two projects and their close proximity, the response to its request for review will be similar to the one received by the Mankato Energy Center.

5.2 PUBLIC PARTICIPATION

5.2.1 IDENTIFICATION OF LAND OWNERS

The landowners of the property used for the proposed transmission lines and the substation expansion are Xcel Energy and Calpine.

5.3 REQUIRED PERMITS AND APPROVALS

Table 5.1 shows the permits potentially required for the Project.

Table 5.1
Potential Required Permits

Permit	Jurisdiction
Local Approvals	
Floodplain Permit	City of Mankato
State of Minnesota Approvals	
Route Permit Application (Alternative Process)	EQB
401 Certification	MPCA
NPDES Permit	MPCA
Federal Approvals	
Section 404 Permit (GP/LOP-98-MN)	U.S. Army Corps of Engineers

5.3.1 LOCAL APPROVALS

Floodplain Permit

A floodplain permit is required "…prior to the placement of fill, excavation of materials, or the storage of materials or equipment within the floodplain." (City of Mankato City Code 17.2.B.2). Xcel Energy will work with the City of Mankato to obtain the floodplain permit in accordance with the City Code, which will include a review of the plans for the substation and transmission line construction.

5.3.2 STATE OF MINNESOTA APPROVALS

Route Permit (Alternative Process)

A HVTL cannot be constructed without a route permit approved by the EQB. A route permit under the Alternative Process requires the applicant to be eligible as outlined in Minnesota Rules 4400.2000.

Section 401 Certification

Xcel Energy requires a Section 401 Water Quality Certification from the MPCA when federal approval for the project is obtained (i.e., Federal Energy Regulatory Commission permits or Army Corps of Engineers Individual Permit).

NPDES Permit

A National Pollutant Discharge Elimination System (NPDES) permit is required for storm-water discharges associated with construction activities disturbing soil equal to or greater than one acre in area. A requirement of the permit is to develop and implement a Storm-Water Pollution Prevention Plan (SWPPP), which includes Best Management Practices (BMPs) to minimize discharge of pollutants from the site. This permit will be acquired since the substation work impacts more than one acre.

5.3.3 FEDERAL APPROVALS

Corps of Engineers Permit

The U.S. Army Corps of Engineers (COE) has issued Xcel Energy a permit for certain activities performed in Minnesota in accordance with the terms and provisions of a General Permit (GP)/Letter of Permission (LOP). If a transmission line is placed in a wetland for this project, it will be covered under the Company's COE GP/LOP-98-MN permit.

6.0 SUMMARY OF FACTORS TO BE CONSIDERED

In determining whether to issue a permit for a high voltage transmission line, the EQB considers 14 factors listed in Minnesota Rule 4400.3150. Because a Certificate of Need Application is pending before the Minnesota Public Utilities Commission for the Mankato Energy Center and its associated transmission lines, questions of need, including size, type, timing, alternative system configurations, and voltage are not to be considered here (Minnesota Rule 4400.3250). A discussion of each of the relevant factors as they relate to the Project is provided below.

6.1 EFFECTS ON HUMAN SETTLEMENT AND AESTHETICS, INCLUDING BUT NOT LIMITED TO, DISPLACEMENT, NOISE, AESTHETICS, CULTURAL VALUES, RECREATION, AND PUBLIC SERVICES

The proposed route will result in no displacement of existing homes or businesses. The noise related to the proposed line will be minimal, as described in Section 4.2.3 of this Application. The impacts associated with aesthetics and recreation from the Project will be minor. The transmission lines and substation expansion are consistent with adjacent land uses, presenting a minor visual impact to the adjacent Minnesota River. The Project will have no impact on cultural values or public services within the Project corridor.

6.2 EFFECTS ON PUBLIC HEALTH AND SAFETY

No effects on public health or safety are anticipated. The proposed line will be constructed to comply with NESC and all Company guidelines and standards. The proposed 115 kV transmission line will have a maximum magnitude of electric field density of approximately 1.24 kV per meter underneath the conductors one meter above ground level. The proposed 345 kV transmission line will have a maximum magnitude of electric field density of approximately 4.6 kV per meter underneath the conductors one meter above ground level. Both are significantly less than the EQB's standard of 8 kV. The EQB standard was designed to minimize the hazard of shocks from the line touching large objects under extra high voltage transmission lines of 500 kV or greater. Moreover, the most recent scientific studies on EMF have not found any significant link between EMF and health effects.

6.3 EFFECTS ON LAND-BASED ECONOMIES, INCLUDING, BUT NOT LIMITED TO, AGRICULTURE, FORESTRY, TOURISM, AND MINING

No impacts to agriculture, forestry, tourism, or active sand and gravel mining operations will occur.

6.4 EFFECTS ON ARCHAEOLOGICAL AND HISTORIC RESOURCES

The proposed route is not expected to impact any archaeological sites or historic standing structures.

6.5 EFFECTS ON THE NATURAL ENVIRONMENT, INCLUDING EFFECTS ON AIR AND WATER QUALITY RESOURCES, AND FLORA AND FAUNA

No significant impacts to air quality will result from the Project. The impacts to water quality resources will relate primarily to possible soil disturbance during construction. During construction there is the possibility of sediment reaching surface waters as the ground is disturbed by excavation, grading, and construction traffic. Xcel Energy will implement practices during construction to prevent sediment from entering surface waters, such as silt fences. Impacts to wetlands are possible since transmission line structures may need to be placed in wetlands to accommodate clearance issues. The extent of the impact will not be known until the design is finalized, but at this time is expected to be at most two poles placed within the wetland. Construction crews will avoid crossing wetland areas with equipment, and when crossing these areas is necessary, special mats will be used to decrease compaction. The amount of flora that will be impacted will not be known until the design is finalized. Some trees will need to be removed, but only the trees located in the area of the substation expansion and transmission line right-of-way, or that would interfere with the safe operation of the line. Since flora at the site will be impacted, it is possible that wildlife may be displaced due to loss of habitat. This impact will be temporary since similar habitat is adjacent to the site. No impacts on fauna are anticipated due to the presence of the new transmission lines since there are no problems, such as avian collisions, with the existing transmission lines.

6.6 EFFECTS ON RARE AND UNIQUE NATURAL RESOURCES

The USFWS and DNR did not identify any rare or unique natural resources that would be impacted by the Project.

6.7 APPLICATION OF DESIGN OPTIONS THAT MAXIMIZE ENERGY EFFICIENCIES, MITIGATE ADVERSE ENVIRONMENTAL EFFECTS, AND COULD ACCOMMODATE EXPANSION OF TRANSMISSION CAPACITY

The proposed route accommodates the proposed Mankato Energy Center plant. Xcel Energy will investigate line designs and location to minimize the number of structures required to be placed in the wetland.

6.8 USE OR PARALLELING OF EXISTING RIGHTS-OF-WAY, SURVEY LINES, NATURAL DIVISION LINES, AND AGRICULTURAL FIELD BOUNDARIES

Since the route is a very short distance between Xcel Energy's Wilmarth Substation and the proposed Mankato Energy Center, limited opportunities for corridor sharing were available. The project will be located on Xcel Energy and Calpine property.

6.9 USE OF EXISTING LARGE ELECTRIC POWER GENERATING PLANT SITE

This factor is not applicable to the Project.

6.10 USE OF EXISTING TRANSPORTATION, PIPELINE, AND ELECTRICAL TRANSMISSION SYSTEMS OR RIGHTS-OF-WAY

No existing transportation or pipeline rights-of-way will be used for this project. Land owned by Xcel Energy currently being used for electrical transmission systems will be used to construct the Project.

6.11 ELECTRICAL SYSTEM RELIABILITY

The Project is important to the overall electrical system reliability since it is required in order to tie the Mankato Energy Center into the rest of the electrical system.

6.12 COSTS OF CONSTRUCTING, OPERATING AND MAINTAINING THE FACILITY WHICH ARE DEPENDENT ON DESIGN AND ROUTE

This factor is not applicable to the Project because only one route is proposed.

6.13 ADVERSE HUMAN AND NATURAL ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

The unavoidable adverse impacts to the natural environment are minimal. Construction related activities would cause short-term impacts, mainly in the form of disturbed soils. No adverse impacts to the human environment are anticipated.

6.14 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The proposed route does not require any irreversible or irretrievable commitment of resources.

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8.0 DEFINITIONS

Archaic	A time frame in North American pre-history spanning 7,000 years between 10,000 before present to 3,000 years before present, after Paleoindian and before Woodland times.
Avian	Of or relating to birds.
A-weighted scale	The sensitivity range for human hearing
Conductor	A material or object that permits an electric current to flow easily.
Corona	The breakdown or ionization of air in a few centimeters or less immediately surrounding conductors.
Fauna	The collective animals of any place or time that live in mutual association.
Flora	The collective plants of any place or time that live in mutual association.
Hydrocarbons	Compounds that contain carbon and hydrogen, found in fossil fuels.
Ionization	Removal of an electron from an atom or molecule.
Mississippian	A cultural period of the southeastern North American Aborigine Indians dating from 1,300 to 400 before present.
Oxide	A compound of oxygen with one other more positive element or radical.
Ozone	A form of oxygen in which the molecule is made of three atoms instead of the usual two.
Paleoindian	A cultural period of the North American Aborigine Indians defined as 40,000 to 12,000 years before present.
pH	A unit for measuring hydrogen ion concentrations. A pH of 7 indicates a "neutral" water or solution. At pH lower than 7, a solution is acidic. At pH higher than 7, a solution is alkaline.
Raptor	A member of the order Falconiformes, which contains the diurnal birds of prey, such as the hawks, harriers, eagles and falcons.
Scientific and Natural Area	A program administered by the DNR with the goal to preserve and perpetuate the ecological diversity of Minnesota's natural heritage, including landforms, fossil remains, plant and animal communities, rare and endangered species, or other biotic features and geological formations, for scientific study and public edification as components of a healthy environment.
Stray Voltage	A natural phenomenon that can be found at low levels between two contact points in any animal confinement area where electricity is grounded. Electrical systems – including farm systems and utility distribution systems – must be grounded to the earth by code to ensure continuous safety and reliability. Inevitably, some current flows through the earth at each point where the electrical system is grounded and a small voltage develops. This voltage is called neutral-to-earth voltage (NEV). When a portion of this NEV is measured between two objects that may be simultaneously contacted by an animal, it is frequently called stray voltage. Stray voltage is not electrocution and is not DC, ground currents, EMFs or earth currents. It only refers to farm animals that are confined in areas of electrical use and not to humans.
Ultraviolet radiation	A portion of the electromagnetic spectrum with wavelengths shorter than visible light.
Voltage	Electric potential or potential difference expressed in volts.
Wetland	Wetlands are areas that are periodically or permanently inundated by surface or ground water and support vegetation adapted for life in saturated soil. Wetlands include swamps, marshes, bogs and similar areas.
Woodland	A cultural period of the Eastern North American Aborigine Indians dating from 3,000 - 1,300 before present.

Appendix A

EQB Notice

Appendix B

Project Maps

Appendix C

Agency Letters